

Notice of Allowability

Application No.

10/085,759

Examiner

Stephen Rosasco

Applicant(s)

COTE ET AL.

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 12/8/03.
2. ☒ The allowed claim(s) is/are 1-9 and 33-50.
3. ☒ The drawings filed on 28 February 2002 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 10/6/03
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

ALLOWANCE ACTION

In response to the Amendment of 12/8/03, wherein applicant elected the claims of Group I, canceled claims 10-32 and added claims 33-50, the examiner allows all pending claims 1-9 and 33-50.

The following is an examiner's statement of reasons for allowance: the claimed invention is distinguished over the prior art of record in that the prior art does not teach a method for manufacturing an integrated circuit having a layer of material, the layer described by a layout, wherein substantially all of the layer of material will be defined using phase shifting, the method comprising:

identifying a plurality of features in the layout to be defined using phase shifting, each of the plurality of features comprised of a plurality of edges;

placing a plurality of shifter shapes proximate to edges of the plurality of features, wherein the plurality of features includes a first feature having a first edge and a second edge, the first edge adjoining the second edge, and wherein the plurality of shifter shapes

includes a first shifter shape placed on a first edge and a second shifter shape placed on a second edge, the first shifter shape and the second shifter shape separated by a minimum distance;

assigning phase to the plurality of shifter shapes according to phase dependencies and costs to create a plurality of phase shifters; and refining the plurality of phase shifters.

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Watanabe (6,400,838) teach the method of

a) a developing design data used to delineate patterns on a sample into gradational data expressed in non-binary, multiple gradation levels having a maximum level of $4n$, where n is a positive integer equal to or larger than one;

(b) finely adjusting edges of the patterns by a process employing the gradational data expressed in the non-binary multiple gradation levels and generating reference data, wherein the finely adjusting step modifies a size of the patterns by changing edge positions of the patterns constructed with the gradational data;

(c) generating measured data from actual patterns delineated on the sample;
and

(d) comparing the measured data with the reference data and the edges of the pattern of the reference data being adjusted by the finely adjusting step, wherein the finely adjusting step includes a corner rounding step of rounding corners in the pattern constructed with the gradational data, the corner rounding step including the steps of: converting the gradational data into binary data;

detecting corners in the pattern constructed with the gradational data according to the binary data;

deciding the size of each of the corners according to the binary data;

generating rounding data for the corners according to information provided by the deciding step; and

rounding the corners according to the rounding data and gradational data.

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Watanabe also teaches that making the size of a pixel of the developed pattern data smaller than a sensor pixel size to adjust the pattern data to match with the microscopically displaced edges and rounded corners of the actual photomask patterns increases the quantity of the pattern data to raise a need of high-performance computers and high costs.

Watanabe does not teach the details of placement of the shifter shapes as recited in the claimed invention including the above cited limitations.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Rosasco whose telephone number is 571-272-1389. The examiner can normally be reached on M-F from 9 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff, can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. General Information call (571-272-1700).

A handwritten signature in black ink, appearing to read "S. Rosasco", with a stylized, elongated initial "S" and a trailing flourish.

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
2/5/04